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covered in poisonous buttermilk by Dr. J. P. Browne, of Galt, Ontario, were developed in the milk after it had been taken from the cow, instead of being introduced into the cow's system with the food and finding their way through the blood into the milk.

NOTES.

WHEN Professor Agassiz gave his opening lecture in the Museum of Comparative Zoology at Cambridge in 1860, he said that American students had been forced to visit Europe, if they were desirous of making any extended study in the natural sciences, but that he intended to reverse this and compel European students to visit America; and by his judicious purchase of type collections abroad (thanks to the liberality of citizens and our State) he has made his promise good.

Professor Henry A. Ward of Rochester, New York, formerly a student of Professor Agassiz, and since Professor of Geology and Zoology in the Rochester University, has, under humbler auspices, long been working toward the same end. His large cabinet of geology and mineralogy at Rochester is well known to many of our readers. He long ago felt the necessity of bringing before the American student examples of those larger and rarer fossils known to geological science, of which only single specimens existed.

For this purpose he visited Europe, engaged accomplished workmen and commenced the foundation of a collection of casts. With untiring patience and sagacity he secured the moulds of nearly everything of importance, at enormous expense, carrying his workmen from one museum to the other, and taking moulds of the choicest specimens, for a period of three years.

The difficulties encountered in some of his experiences would form an interesting chapter. After many difficulties, he managed to secure moulds of the rare *Megatherium*, *Glyptodon*, *Deinotherium*, *Diprotodon*, *Sivatherium*, *Colossochelys*, *Mosasaurus*, *Plesiosaurus*, and many other unique specimens in European museums. Thorough and methodical in all his work, he felt that this collection of casts should be symmetrical and complete, as an educational collection, and so was commenced the famous Ward collection of casts. Thousands of dollars were spent in buying especially choice specimens of the obtainable forms solely for the

purpose of making casts from them, and the originals are still preserved in his museum at Rochester. Every educational institution in the country may now possess perfect casts of the rarest fossils, forming exact facsimiles of the unique originals in the British Museum, the Jardin des Plantes, and other foreign museums, besides a representative collection of all that is needed to illustrate geological history.

From this important beginning, Professor Ward has gone on enlarging the usefulness of his work by adding to his stock, skins and skeletons of animals, fossils and minerals, and alcoholic specimens, so that institutions may provide themselves with collections accurately labelled and arranged, without sending abroad for the purpose.

With the capital invested in so large an enterprise, rapid sales must be effected, and one not familiar with the scientific attainments of Professor Ward, and the sole desire that animates him, to spread far and wide the type collections so important for educational purposes, might confound his occupation with that of the ordinary dealer in natural history objects, such as one may find in any large city. While in the latter case, however, with some laudable exceptions, the dealers offer simply the fortuitous gatherings of sailors, comprising curiosities, shells, and detached portions of animals, like turtles' shields, sharks' jaws, and the like, of no intrinsic value, the work in which Prof. Ward is engaged is one of a solid scientific character. His outlays are immense, yet everything he does is done solèly in reference to advancing science. He has the endorsement of every naturalist in the country, and already the leading museums in the country are indebted to him for some of their choicest material.

Every scientific man should visit Professor Ward's place at Rochester, New York, and see the bee-hive of industry he has built up around him. We visited Rochester in February, solely for the purpose of examining the new industry. Here one finds several large buildings, besides sheds and yards devoted to receiving, preparing and shipping specimens. There are twelve men constantly employed as taxidermists, osteologists, moulders and carpenters. Two of the osteologists he has brought from the Jardin des Plantes, Paris, where they had worked for a long time under the direction of eminent anatomists. The skeletons and skulls prepared here are beautiful in their whiteness and the elegance of

their mounting. In the University building is Professor Ward's zoological cabinet, still his private property, containing type forms of the animal kingdom. This is carefully labelled and is strictly an educational collection.

In Cosmos Hall is a large room containing a large and valuable geological collection, particularly rich in Ammonites, fossil cuttle fishes, with the ink glands still preserved; beautiful fossil fishes from the Lias of England and Germany; fine Saurians in slabs; Ichthyosaurus, Plesiosaurus, Teleosaurus; also the leg bones and other remains of the remarkable Dinornis from New Zealand; Mastodon and other mammal remains, and an almost perfect skeleton of the rare Glyptodon, the gigantic fossil armadillo.

Great interest attaches to this collection since it contains the original specimens of many of his casts, which have already a traditional value, now that so many institutions possess them. This series of *originals* is of intense interest, and will alone give tone and character to any geological cabinet in which they may be incorporated. In this room may also be seen relief maps and various models of geological import; many of these are familiar to College professors through the descriptions and figures given in Ward's "Illustrated Catalogue." At the time of our visit he was packing a series of casts for the Syracuse University, and a Megatherium was being cast for Dartmouth College. A cast of the skeleton of this latter huge animal may be seen in the Geological Hall of the Smithsonian Institution at Washington, where it was placed by Professor Ward, and copies of it are already in several other museums together with other of his specimens. The series of casts have been invaluable in advancing the study of geology, as their possession is just as important to the instructor in this department, as the possession of the manikin and skeleton is to the successful teaching of human anatomy.

The zoological portion of Professor Ward's establishment most interested us. Here all is on the same large scale. In bringing this collection together, Professor Ward has not only visited various portions of this country and Europe, Asia and Africa, but has his correspondents all over the world, and is constantly receiving from them most varied and rare material. While we were there he had just finished the preparation of a giraffe, thirteen feet in height, and was unpacking boxes containing a moose from Nova Scotia, a caribou from Maine, a bear from Pennsylvania, a huge

basking-shark from the Atlantic coast; and, from Professor Agassiz, a walrus, a small whale, and the rare Rocky Mountain goat, to be mounted for the Cambridge museum.

One building is devoted to taxidermy. The upper room in this building is a wonder to behold; hanging from the ceiling are hundreds of skins, including apes, monkeys, wolves, bears, hyænas, lions, tigers, sloths, ant-eaters, armadillos, buffaloes, deer, elk, moose, giraffe, yak, wild boar, peccaries; besides an immense collection of such animals as kangaroos, *Echidna*, *Wombat*, *Tasmanian devil*, *Ornithorynchus*, *Thylacinus* and other rare skins. Some huge alligators, turtles and other reptiles completed the display. In an adjoining room are kept fishes, batrachians, and other specimens in alcohol; among these are *Lepidosteus*, *Amia*, *Menopoma*, *Spatularia*, *Scaphiorynchus*, *Aspidonectes*, and other American species of special anatomical interest. Still another building is devoted exclusively to the preparation of skeletons; these are received with the flesh dried upon them, and are subjected to a long process of maceration and bleaching; over fifty vats are ready to receive them. These vats are all systematically numbered, and the most painstaking care is manifested to secure every bone, so that each specimen may be perfect. Custom work is combined with all this; and hundreds of specimens are received from the museums of Cambridge, Boston, Salem, Philadelphia, Albany, and many of our colleges, for the purpose of being properly prepared and mounted.

We have dealt thus in detail that the public may know the true character of the enterprise in which Professor Ward is engaged; and the duty of every one interested in science and education to cordially sustain him.

Professor Ward has by long study and by travel in foreign countries, as well as by his long experience as a professional teacher of zoology and geology, fitted himself for the important and arduous task before him.

He has received the unqualified endorsement of the leading naturalists, and his untiring devotion to the work, and the immense outlays he has made, should be widely known among those who desire to sustain in this country an institution where one may secure the material for the foundation of a museum, as well as examples for educational purposes.—E. S. MORSE.

[We had the pleasure last summer of visiting Professor Ward's

Rochester Establishment, and of seeing his important collections. One point which Professor Morse has failed to notice is the work done by Mr. Ward in the matter of blocks, labels, shields, and other appliances for the arrangement of cabinets. He has not only planned, but has gone on and constructed the cabinet cases in Vassar, Alleghany and Pittsburg colleges, in the Orange Judd Hall of Science at Wesleyan University in Middletown, Conn., and in the new Syracuse University. At the time of going to press we are informed that Mr. Ward has been engaged to construct the cabinet cases in the new Geological hall—two hundred feet long—of the Smithsonian Institution.—F. W. P.]

It will be seen by the following circular, issued by Professor Agassiz, that a summer school of science for teachers is to be held on Penekese Island, Buzzard's Bay, next summer. From present appearances we may predict every success in its administration. A rare opportunity, such as we believe no country has heretofore afforded, will be offered to those anxious to study the biology, chemistry, and physics, of the sea. Experts will carry on their explorations during three months, and students will thus under the stimulus of their example, be able to learn how to collect, prepare, and study marine animals and plants. If successfully carried out, this school will inaugurate, we believe, a new system of public instruction, and exert the happiest influence on the future progress of science in this country, which depends more than ever on making original investigators. Without further remark we present our readers with a copy of the programme, adding that those who wish to avail themselves of the privileges of the school may address Prof. Agassiz, or the editors of this journal:—

**PROGRAMME OF A COURSE OF INSTRUCTION IN NATURAL HISTORY,
TO BE DELIVERED BY THE SEASIDE, IN BUZZARD'S BAY, DURING
THE SUMMER MONTHS, CHIEFLY DESIGNED FOR TEACHERS WHO
PROPOSE TO INTRODUCE THE STUDY INTO THEIR SCHOOLS, AND
FOR STUDENTS PREPARING TO BECOME TEACHERS.**

Zoölogy in general, and Embryology of the Vertebrates, by Prof. L. AGASSIZ.

The extinct Animals of Past Ages, compared with those now living, and the Methods of identifying them, by Prof. N. S. SHALER.

Comparative Anatomy and Physiology of the Vertebrates, by Prof. B. G. WILDER.

The Animals and Plants living in Deep Waters, and the Peculiar Conditions of their Existence, by L. F. DE POURTALES.

Embryology of the Radiates, by A. AGASSIZ.

Natural History and Embryology of the Mollusks, by Prof. E. S. MORSE.

How to make Biological Collections illustrative of the History of Insects injurious to Vegetation, by Prof. H. A. HAGEN.

Natural History and Embryology of the Articulates, by Dr. A. S. PACKARD, Jr.

Natural History of the Fishes and Reptiles, by F. W. PUTNAM.

Natural History of Birds and Mammals, by J. A. ALLEN.

On Breeding, and Nests and Eggs of Birds, by Dr. THOMAS W. BREWER.

Practical Exercises in the Use of the Microscope, by E. BICKNELL.

Instruction in Drawing and Painting of Animals, by PAULUS ROETTER.

On the Preservation of our Sea-Fisheries, by Prof. SPENCER F. BAIRD.

On Fish Breeding, by THEODORE LYMAN.

The Faunæ of the North Atlantic, compared with one another and with those of other Parts of the World, by

The Plants of the Sea, by

The Physics of the Sea, by Prof. JOSEPH LOVERING.

Physical Hydrography, by Prof. H. MITCHELL.

Chemistry of Feeding and Breathing, by Prof. W. GIBBS.

Chemistry of the Sea and Air, by Prof. JAMES CRAFTS.

The terms of admission, and the day of opening the course, will be advertised as soon as all the necessary arrangements can be made, including information concerning board, etc. It is hoped that the liberality of friends of education may make it possible to offer this course free of charges to teachers and students. A number of aquariums and the necessary apparatus to dredge in deep water will be provided. The Superintendent of the United States Coast Survey and the United States Commissioner of Fisheries have promised their coöperation to the extent of their ability, without interfering with the regular service of their departments. Professors SHALER, WILDER, PACKARD, and perhaps others, may spend the whole, or nearly the whole, season at the school, with a view of superintending the laboratory work, while the other gentlemen will stay there only part of the time, or as long as required by the share they are able to take in the course of instruction.

Excursions will be made frequently to give those present an opportunity of learning how to observe, and also of making collections with which they may teach classes at home.

It is but justice to Professor Shaler to say that the first suggestion of giving such a course by the seaside, was made by him.

In behalf of the Faculty of the Museum of

Comparative Zoölogy in Cambridge, Mass.

L. AGASSIZ.

We are happy to announce that Penekese Island, together with the sum of \$50,000 to form a permanent endowment of the school, has been generously presented for the purpose by a gentleman in New York interested in science. Buildings will at once be erected, and the school opened early in July. We shall give further par-

ticulars concerning this munificent and most unexpected gift in our next number.

THE annual meeting of the California Academy of Sciences was held on Monday evening, January 6, 1873. The following gentlemen were elected officers for the ensuing year:—*President*, George Davidson; *Vice-President*, John Hewston; *Treasurer*, Elisha Brooks; *Corresponding Secretary*, Henry G. Hanks; *Recording Secretary*, C. G. Yale; *Director of the Museum*, H. G. Bloomer; *Librarian*, C. N. Ellinwood, M.D.; *Trustees*, T. P. Madden, D.D. Colton, Robert E. C. Stearns, Oliver Eldridge. The President, Treasurer and Recording Secretary, are also Trustees, *ex-officio*. The President's annual address shows that an increasing interest in the objects of the Academy is manifested by the public, and that the coming year is likely to be one of material interest in the affairs of the Academy.

A regular meeting of the California Academy of Sciences was held Feb. 18, 1873, in which General Hewston announced to the Academy a magnificent donation from James Lick, in the form of a deed to a piece of property on Market street, adjoining the premises of St. Ignatius College on the east. The dimensions of the plot were eighty feet front by two hundred and seventy-five feet in depth, being one hundred vara lot No. 126. The conveyance of the property is subject to various conditions, the purport of which is that the Academy shall erect thereon a substantial three story brick building, faced with granite, in classic style of architecture, and decorated with emblems of science. The building and property shall be devoted exclusively to the purposes of science; it shall remain unencumbered in the possession of the Academy; no part shall be leased at any time, nor shall its use be permitted for political or religious purposes in any way. It further devolves upon the Academy to secure the fund requisite for the erection of the edifice specified within the period of two years, and to prosecute the project to completion within a reasonable time. The plan of the building contemplates among its principal apartments a library, museum and lecture room. The announcement of this donation excited great enthusiasm.

The President remarked that he felt incompetent at the time to express the sense of the Academy in fitting terms. The Trustees, in considering the project of securing accommodations for the

Academy, had never thought of exceeding an expenditure of \$25,000. But this site alone, as he had been assured by competent judges, exceeded in value \$150,000. A meeting of the Trustees will be held to-day, when the body will wait upon Mr. Lick personally, and express the thanks of the Academy for his munificent gift.

As a preliminary expression of gratitude, on motion of Dr. Hewston, the rules of the Academy were suspended, and Mr. Lick was elected a life member.

Professor Davidson read a paper, which embodied the results of laborious research, on the probable periodicity of rainfall, being illustrated with diagrams. He believes in a law of periodicity, but the problem of establishing it was an intricate one, and it had not been developed by the observations of a century. The observations of twenty-one years in California had afforded no direct conclusions.

Dr. Hewston read an exceedingly interesting paper, descriptive of the marine animal, a species of *Limnoria*, which has recently appeared in the harbor and commenced its ravages on the wharves, threatening the certain and speedy destruction of the whole works of the city front, unless some effective means are adopted for arresting its depredations. Specimens were also submitted to the inspection of the Academy, under the microscope.

Mr. Dall read a paper on the avi-fauna of the Aleutian Islands.

SCIENCE in this state has met a loss in the death of Dr. Henry C. Perkins, of Newburyport, one of the trustees of the Peabody Academy of Science. He devoted much time to microscopical and astronomical studies. One of the leading physicians in this state, he also found time to study science practically. He died very suddenly, February 3d, aged 69.

THE eminent botanist, Professor John Torrey, died March 10th, of pneumonia after a short illness. We can now but refer to the severe loss botanical science in America has suffered from his death:

PROFESSOR SEDGWICK, the celebrated English geologist, died on the 27th of January, aged eighty-seven years. His scientific essays were published mainly in the Transactions of the London Geological Society.